

REMARKS

The present Amendment amends the specification to correct obvious typographical errors. For example the “400” on page 40, line 7, is the operating temperature in degrees Centigrade, as can be seen from other Examples. Likewise, the substitution for “peso” in Table 3, has been changed to “weight %”, as is apparent from Table 18 on page 44.

Rejection of Claims 10-14 and 19-24 under § 102

Claims 10-14 and 19-24 are rejected under 35 U.S.C. § 102 as being anticipated by Evans et al, U.S. Patent No. 4,657,664 (“Evans et al”).

Reconsideration of this rejection is requested, since Evans et al do not anticipate claims 10-14 and 19-24. Applicants’ have discovered a process for upgrading heavy petroleum hydrocarbons and residues under low pressure conditions to achieve very low levels of sediment and sludge formation thereby making the process safer and more cost effective, while still achieving high quality product. Claim 10 recites that operating pressures *in each* of a two-stage hydrotreating process for heavy crude oils are in the range of *40 to 130 kg/cm²*. By utilizing such low process pressure conditions, the process achieves minimal formation of sediment and sludge well below 0.80 wt. % and 0.65 wt. %, as seen, for example, in Table 6 on page 25, where the sediment and sludge was only 0.12 wt % for the first stage and 0.32 wt. % for the second stage in which a crude was hydrotreated, as well as other examples of the present specification, including Table 15 on page 40 where sediment and sludge in each stage is below 0.1 wt. % for hydrotreated residua. Evans et al neither teaches nor suggests that sediment and sludge can be reduced for each stage to such magnitudes by utilizing the claimed pressures in each stage of the hydrotreating process.

Although Evans et al disclose a pressure range which overlaps the claimed range of 40 to 130 kg/cm², such disclosure does not *anticipate* the claimed range of claim 10. The invention of claim 10 is not disclosed in the Evans et al with sufficient specificity to constitute an

anticipation. In the *Atofina v. Great Lakes Chem. Corp*, 441 F.3d 991, 999, 78 USPQ2d 1417, 1423 (Fed. Cir. 2006) wherein the Federal Circuit held that a reference temperature range of 100-500°C did not describe the claimed range of 330-450°C with sufficient specificity to be anticipatory stating (USPQ at 1423):

...Here, the prior art, JP 51-82206 discloses a temperature range of 100-500°C which is broader than and fully encompasses the specific temperature range claimed in the '514 patent of 330-450°C. Given the considerable differences between the claimed range and the range in the prior art, no reasonable fact finder could conclude that the prior art describes the claimed range with sufficient specificity to anticipate this limitation of the claim.

Additionally, the Federal Circuit added (USPQ 1424):

Moreover, the disclosure of a range of 150 to 350°C does not constitute a specific disclosure of the endpoints of that range, i.e., 150 to 350°C, as Great Lakes asserts. The disclosure is only that of a range, not a specific temperature in that range, and the disclosure of a range is no more a disclosure of the end points of the range than it is of each of the intermediate points.

Accordingly, a pressure range disclosed by Evans et al that overlaps the claimed range is not an anticipation of the range of claim 10 nor the claims dependent therefrom. Moreover, it is noted that Evans et al do not disclose a single example using an operating pressure within the range recited in claim 10 for each stage of their hydrotreating process. Thus, Evans et al disclose in Table II (bridging columns 9-10), a hydrogen pressure of 2,000 psig, which corresponds to 140 kg/cm², which is outside of the claimed range, while Table VI in col. 13 of Evans et al discloses a pressure of 2700 psig corresponding to 190 kg/cm², which is even further outside of the claimed range of claim 10. The Examples are strong evidence that the range of claim 10 is not anticipated by Evans et al.

Accordingly, claim 10 is not anticipated, nor are the claims dependent from claim 10 anticipated, namely, claims 11-14 and 19-24. Thus, the rejection of claims 10-14 and 19-24 as being anticipated by Evans et al et al should be withdrawn.

Rejection of Claims 15-18 and 26-28 as Anticipated or Obvious

Claims 15-18 and 26-28 are rejected under 35 U.S.C. § 102 (b) as anticipated by or, or in the alternative, under 35 U.S.C. § 103(a) obvious over the Evans et al.

Initially, it is submitted that the rejection of claims 15-18 and 26-28 as being anticipated should be withdrawn for the reasons discussed above as to claims 10-14 and 19-24, namely, claims 15-18 and 26-28 are either ultimately dependent from claim 10 or contain the low pressure range not anticipated by Evans et al.

Moreover, it is further submitted that claims 15-18 and 26-28 are not obvious over Evans et al. Claim 15 is dependent from claims 10-14 and thereby contains all of the limitations of such claims. However, claim 15 further recites that that the process minimizes the formation of sediments and sludge to a *maximum value of 0.65 % by weight* of the hydrotreated hydrocarbon. The only Example in Evans et al of a low solids value is shown in Table IV in column 11, in which the solids value was 0.63 which increased to 0.81 after a temperature increase, which levels were achieved at a pressure of 140 kg/cm², which is above the 40 to 130 kg/cm² range of claim 15. The data in Table IV is presented by Evans et al to demonstrate the advantages of a two-catalyst system over a single catalyst system (see discussion in column 12, lines 15-23 regarding use of higher temperatures as compared with a single catalyst system).

Evans et al do not teach nor suggest that lower pressures could be used in each stage of a two-stage process to achieve solids formation in each stage well below the typical maximum commercial limit of 0.8 wt. %, namely, below 0.65 weight %, and the advantages of safety and cost realized by using such less severe conditions.

In contrast, Applicants' Examples 1-8 demonstrate that using operating pressures for each stage within the 40 to 130 kg/cm² range with four different feedstocks having a wide range of impurities achieves sediment and sludge values in *each* of the two stages well below the typical maximum commercial limit of 0.8 wt. % (see, for example, Tables 6, 8, 13 and 15 of the present application). In particular, it is noted that a hydrotreated residua treated using the low

pressure process of the present invention resulted in sediment and sludge of 0.028 in the first stage and 0.035 and 0.044 in the second stage (Table 13 on page 36). Such unexpectedly low values for the formation of sediment and sludge while removing significant quantities of contaminants is a degree of magnitude many times below that achieved under the higher pressure conditions used by Evans et al (Table II) and reported in Table IV, thereby demonstrating the unobviousness of the invention of claim 15 and claims 16-18 dependent therefrom.

Claim 26 has been amended to recite that the first reaction stage contains a nickel-molybdenum catalyst on gamma-alumina support, while the second reaction stage contains a cobalt-molybdenum catalyst on a gamma-alumina support. Support for such recitation is found on page 14, lines 16-19 of the present specification. Thus, claims 26 even further distinguishes Evans et al, who disclose use of a molybdenum on silica-alumina catalyst for the first stage and no use of a gamma-alumina support in either stage (Table I in column 10).

Moreover, claim 26 recites that the amount of sediment and sludge formed in *each* of the first and second reaction stages is below 0.8 % by weight of the hydrotreated hydrocarbon. Likewise, dependent claim 27 recites that such level is below 0.65 wt. % for *each* stage. Such achievement is neither taught nor suggested by Evans et al, who do not disclose the level of sediment and sludge formation in *each* stage of Example 1. Thus, although a solids formation of 0.63 and 0.81 are disclosed in Table IV for the two stage process of Example 1, it is not disclosed what the solids formation for *each* stage A or B is achieved. See, for example, Table 13 of the present application, where sediments and sludge formation is well below 0.8 or 0.65 wt. % for each stage. Thus, claims 26 and 27 are clearly unobvious, as is claim 28, which depends from claim 25. New claim 29 has been added, which claim depends from claim 10 and recites that the sediment and sludge formation in each stage is below 0.65 wt. % and is likewise unobvious.

For the foregoing reasons, the Examiner has not made out a *prima facie* case of obviousness. Accordingly, it is requested that the rejection of claims 15-18 and 26-28 as being anticipated or unobvious be withdrawn.

Rejection of Claim 25 as Obvious

Claim 25, which recites that the catalysts are supported on gamma alumina, is rejected as being obvious under 35 U.S.C. § 103(a) over Evans et al in view of Trueba et al. The Examiner has taken the position that since the Evans et al disclose use of an alumina support (see col. 7, line 63, and Table I in col. 10), it would be obvious to use gamma alumina in view of Trueba et al, who discloses (p. 3393, first paragraph) as being “perhaps the most important with direct application as a catalyst and catalyst support in the petroleum industry” would make it obvious to use.

Claim 25 is dependent from claim 24, which recites use of a nickel-molybdenum as the hydrodemetallization catalyst. Neither Evans et al nor Trueba et al disclosure use of a nickel-molybdenum catalyst on gamma-alumina for as a hydrodemetallization catalyst in the process of claim 10 from which claim 25 ultimately depends.

Trueba et al cannot cure the deficiencies of Evans et al. Trueba discloses a cobalt on gamma-alumina catalyst for use in the Fischer-Tropsch process (page 3393, second paragraph). Such disclosure does not render obvious the use of a gamma-alumina support for a nickel-molybdenum catalyst in the low pressure process of claim 10. New claim 30 is dependent from claim 29 and recites use of nickel-molybdenum on gamma alumina in the first stage and is likewise unobvious.

For the foregoing reasons, the rejection of claims 10-28 should be withdrawn. Prompt and favorable examination is requested.

Respectfully submitted,



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